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ABSTRACT

Strategies actually used by good and poor spellers at different grade levels were examined. The subjects included 20 students from Grades 3 and 4, 22 from Grades 7 and 8, and 31 college undergraduates. Each individual made a list of 10 words misspelled from prepared lists of difficult words. The students "thought aloud" as they studied, and strategies used were noted to include: (1) pronunciation; (2) over-pronunciation, bringing the pronunciation into compliance with the spelling; (3) visual imagery; (4) letter rehearsal; (5) word analysis; (6) pretest comparison; (7) spelling rules; and (8) miscellaneous strategies. Only over-pronunciation correlated positively with posttest scores; letter rehearsal correlated negatively with subsequent scores. The more effective strategy was increasingly found with college students, suggesting that more effective strategies increase with age. Posttest scores, study times, and their correlations with posttest scores are tabulated. Spelling word lists correlations with posttest scores are tabulated. Spelling word lists for the three educational levels are appended. (SLD)

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Study Strategies for Learning Spelling: What Works and What Does Not

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Paper presented at the annual meeting of the

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In spelling instruction, and in instruction in other content areas as well, students are more often told what to study than how to study. Yet it is becoming increasingly apparent that many students lack metacognitive knowledge of effective learning and study strategies (Brown, 1978; Duell, 1986; Flavell, 1985; Snowman, 1986). While learning and study strategies can probably be improved with training (Duell, 1986), educational researchers must first determine which strategies are effective for learning in a particular content area.

Two frequently advocated learning strategies for spelling are pronunciation and visual imagery. Pronouncing a spelling word is a common component of study-test and test-study-test methods (e.g., Allred, 1977; Fitzsimmons & Loomer, 1977; Hildreth, 1955; Hillerich, 1976, 1977; Horn, 1919). Closing one's eyes and visualizing what the word looks like is also a frequent recommendation (e.g., Fitzsimmons & Loomer, 1977; Harris, 1985; Hildreth, 1955; Hillerich, 1976, 1977; Horn, 1919; Radebaugh, 1985; Walker, 1974). Unfortunately, however, there is a dearth of empirical research supporting the effectiveness of either of these strategies.

For example, there is no evidence to support the pronunciation of spelling words per se as an effective learning technique. Learning to spell is facilitated when students learn that a word's letters are related to its sounds and thereby integrate, or "amalgamate," their orthographic and auditory encodings of a word (Drake & Ehri, 1984; Ehri & Wilce, 1979, 1982). While pronunciation of a word might in some cases enhance letter/sound amalgamation, the inconsistency between the spelling and the normal pronunciation of many words (e.g., silent

letters are not pronounced, schwa vowels are pronounced ambiguously) could actually impede such amalgamation. An alternative learning strategy might be for students to overenunciate or even mispronounce a word in such a way that the pronunciation phonetically matches the word's spelling; such a strategy does in fact appear to lead to better spelling than normal pronunciation (Drake & Ehri, 1984).

With regard to the role of visual imagery in learning to spell, it is quite clear that there are visual factors involved in knowledge of how words are spelled (Ehri, 1980; Lesiak, Lesiak, & Kirchheimer, 1979; Mackworth & Mackworth, 1974; Ormrod, 1985; Radebaugh, 1985; Sloboda, 1980; Tenney, 1980; Walker, 1974). For example, when individuals write a word, they will often inspect it to see if it "looks right." However, only one study (Roberts & Ehri, 1983) has supported the contention that imagery instructions facilitate learning to spell; a second study (Radaker, 1963) lacked an appropriate control group. Contradictory evidence was obtained by Ormrod and Overholser (1987): elementary and college students who were given instructions to form visual images of spelling words actually spelled fewer words correctly than non-instructed control groups. A recent analysis of visual imagery research (Anderson, 1985) indicates that visual images are probably fuzzy, abstract, and easily distorted. If so, imagery may be an inadequate means of encoding the precise, letter-for-letter information required in learning word spellings.

As a first step in empirically establishing the relative effectiveness of different study strategies in spelling, the present research was designed to identify the strategies actually utilized by good and poor spellers at different grade levels. While the research was exploratory and correlational in nature, its

results may provide clues concerning what strategies are likely to be effective and how spelling achievement may be enhanced.

Method

Sample. The sample was drawn from the K-12 Laboratory School and the undergraduate student body at the University of Northern Colorado. There were 20 third- and fourth-graders (9 males, 11 females), 22 seventh- and eighth-graders (11 males, 11 females), and 31 undergraduates. Elementary and junior high students were selected whose parents granted permission for participation in the study. The undergraduates were volunteers from a class in educational psychology; they received extra credit toward their course grade for their participation.

Procedure. For each of the three grade levels, a list of familiar words considered to be difficult to spell was constructed. The three word lists are presented in the Appendix.

Each student met with the experimenter in an individual session. The student was asked to spell words from the appropriate word list until ten words were misspelled. Those words formed the study list for the student. The student was instructed to study each of the ten words and to "think aloud" while doing so. All utterances during the study session were tape-recorded and later transcribed, with exact pronunciations reflected in the transcriptions. Immediately following the study session, a posttest over the ten studied words was administered.

Results

Study Session Times and Codes

The amount of study time devoted to each word, as revealed by the tape recordings of the think-aloud sessions, was measured. In addition, the

transcriptions of these sessions were coded for the study strategies they reflected. Each utterance (a complete or incomplete sentence) was coded as belonging to one of the following categories:

1. Pronunciation: All or part of the word was pronounced as it is in normal, everyday speech (e.g., pronouncing "sarsaparilla" as "SAS-PA-RI-LA".
2. Overpronunciation: All or part of the word was overenunciated or mispronounced in such a way that the pronunciation more closely reflected the actual spelling (e.g., pronouncing "sarsaparilla" as "SAR-SA-PA-RIL-LA" or "SAR-SA-PA-REE-YA," the latter reflecting a Spanish pronunciation of the letter sequence "illa").
3. Visual Imagery: The student's comments reflected visual imagery (e.g., comments describing attempts to form a mental "picture" of the word).
4. Letter Rehearsal: Some or all of the word's letters were listed.
5. Word Analysis: Word roots, prefixes, or suffixes were identified; analogies with other words were drawn; or small words were found within the context of the larger word.
6. Pretest Comparison: The correct spelling was compared with the student's pretest spelling, to identify differences.
7. Spelling Rules: Relevant spelling rules were identified.
8. Miscellaneous: Other strategies were evident; or non-strategic comments were made.

The utterances were coded by a rater unfamiliar with the children's posttest scores. Ten per cent of the utterances were also coded by a second blind rater; an 88% agreement rate between the two raters was obtained.

Statistical Analyses

Means for the posttest scores ranged from 5.25 to 6.61 for the three grade levels, indicating that most students did not attain mastery of the ten words they studied. The amount of time devoted to studying the word lists, ranging from means of 3.73 to 5.33 minutes for the three groups, was negatively (although not significantly) correlated with posttest performance. Means and standard deviations for posttest scores and study times, and the correlations between these two variables, are shown in Table 1.

Insert Table 1 about here

Since increased study time was not associated with greater achievement, the longer study sessions of some students may have reflected the use of inefficient study strategies. Therefore, in order to control for quantity of study time when examining the occurrence of different study strategies and their relationships to posttest scores, the proportion of each strategy within the context of each student's total number of utterances was the unit of analysis.

Means and standard deviations for the proportions of various study strategies used are presented in Table 2. Also presented in Table 2 are analyses of variance of the different strategies across the three grade levels, and correlation coefficients of each strategy with posttest performance.

Insert Table 2 about here

As is evident from Table 2, the majority of utterances (65-77%) were coded as either pronunciation or letter rehearsal. Neither of these strategies showed a significant positive correlation with posttest spelling performance; in fact, rehearsal consistently correlated negatively with posttest scores (significantly so at the college level). Overpronunciation, a strategy used more frequently by the college students than by younger students, emerged as the only strategy showing a significant positive relationship to posttest scores. Other strategies, including visual imagery, were reflected in only a small minority of utterances; possibly as a consequence, they showed no consistent patterns of correlation with spelling performance.

Two developmental trends can be observed by comparing relative proportion of strategy use across the grade levels: overpronunciation was more frequently observed in the college sample than in the younger two groups, and letter rehearsal was utilized more frequently by the younger groups.

Discussion

While numerous models of cognitive processes related to spelling have been proposed (e.g., Beers & Beers, 1981; Gentry, 1978, 1981, 1984; Personke & Yee, 1966, 1971; Simon, 1976), these models focus on retrieval of previously learned words. The present study focused instead on the storage and encoding processes involved in learning to spell words in the first place. Rehearsal and pronunciation were the storage and encoding strategies most commonly observed in this study, but there was no evidence that either of these strategies was effective. Rehearsal in the absence of elaborative processing is a relatively ineffective means of storing information in long-term memory (Craik & Watkins, 1973). Word pronunciation alone does not ensure that a student will amalgamate a word's

letters with its sounds in the way that Ehri (Drake & Ehri, 1984; Ehri & Wilce, 1979, 1982) has described. However, consistent with Ehri's theory that a word's spelling is better learned when its letters are connected with its pronunciation, the overpronunciation or mispronunciation of a word in such a way that the pronunciation closely matches its spelling appears to be an effective strategy. Such a strategy allows students to encode a word's spelling in at least two different ways (auditorially as well as orthographically), thus increasing the likelihood that the correct spelling can later be recalled accurately. Furthermore, overpronunciation is likely to provide a more precise auditory code than normal pronunciation, and precise codes typically lead to better recall than imprecise codes (Ellis & Hunt, 1983; Gagné, 1985; Stein, Bransford, Franks, Owings, Vye, & McGraw, 1982).

The use of visual imagery was observed very infrequently in the children's study sessions. This finding may be an artifact of the study-aloud technique, which is more likely to reflect verbal strategies (such as rehearsal and pronunciation) rather than visual strategies.

The decline of an ineffective strategy (rehearsal) and the increase of an effective one (overpronunciation) with age is consistent with the more general finding that children's metacognitive skills do improve with development (Duell, 1986; Flavell, 1985). Nevertheless, we should not assume that the development of efficient strategies will emerge without assistance: the developmental changes observed in this study appeared after eighth grade, therefore after students had already progressed through most of their school's spelling curriculum. Learning to spell is a difficult and frustrating undertaking for many students, and any

guidance educators can give them regarding effective strategies for studying spelling words should make a painful task easier.

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Table 1

Posttest Scores, Study Times, and Their Intercorrelations

	Grade Level						ANOVA	
	3rd/4th Grade		7th/8th Grade		College			
Variable	M	*SD*	M	*SD*	M	*SD*	F	(p)
Posttest Scores	5.25	*2.57*	5.50	*1.92*	6.61	*2.28*	2.71	(>.05)
Study Time (min.)	3.73	*4.53*	5.34	*5.74*	3.99	*3.51*	0.80	(>.05)
Correlation (Posttest & Study Time)	-.27		-.26		-.09			

Table 2

Proportions of Study Strategies and Their Correlations with Posttest Scores

	3rd/4th Grade			7th/8th Grade			College			ANOVA
Study Strategy	M	*SD*	r	M	*SD*	r	M	*SD*	r	F
Pronunciation	.30	*.15*	.05	.26	*.17*	-.09	.39	*.10*	.18	6.26**
Overpronunciation	.02	*.03*	.11	.03	*.05*	.38	.14	*.11*	.51**	20.06***
Visual Imagery	.02	*.06*	-.37	.01	*.01*	.06	.01	*.02*	.15	1.35
Letter Rehearsal	.47	*.19*	-.08	.43	*.15*	-.12	.26	*.14*	-.51**	13.27***
Word Analysis	.15	*.20*	.25	.11	*.10*	.07	.05	*.06*	.15	3.62*
Pretest Comparison	.01	*.02*	.24	.08	*.13*	.21	.04	*.06*	.20	3.63*
Spelling Rules	.00	*.00*	.--	.01	*.02*	-.06	.01	*.01*	.22	0.62
Miscellaneous	.01	*.03*	-.38	.02	*.05*	-.42	.03	*.05*	.03	0.85

*$p < .05$.

**$p < .01$.

***$p < .001$.

Appendix

Word Lists for the Three Grade Levels

Grades 3 & 4	Grades 7 & 8	Undergraduate
comb	accommodate	etiquette
thread	mischievous	bureaucracy
choice	thoroughly	beneficiary
clothes	attorney	voracious
squirrel	xylophone	magnanimous
spinach	pneumonia	reminisce
laundry	bouquet	picayune
sleigh	turquoise	sarsaparilla
measles	conscience	subpoena
sausage	mispronunciation	esophagus
famous	irresistible	incandescent
fasten	surveillance	coercion
whistle	reign	kaleidoscope
eighth	lieutenant	asphyxiate
astronaut	abominable	strychnine
spaghetti	leukemia	pterodactyl
cemetery	compulsory	chrysanthemum
brighten	acquainted	hemorrhoids
ocean	anonymous	Renaissance
salmon	endeavor	saccharine
reindeer	miscellaneous	hors d'oeuvre
dinosaur	pamphlet	oedipus
neighbor	unenforceable	styrofoam
somersault	rationale	supercilious
gnaw	occurrence	aesthetic
unknown	vengeance	epitome
coarse	questionnaire	archipelago
rehearse	negligent	
foreign	auxiliary	
belief	aerodynamics	